DOCUMENT RESUME

ED 306 847 HE 022 571

TITLE	Gallaudet Summer Institute in Mathematics and Computer Science for Pre-College Teachers of Hearing Impaired Students.
INSTITUTION	American Association of State Colleges and Universities, Washington, D.C.; Gallaudet Univ., Washington, DC.
SPONS AGENCY	National Science Foundation, Washington, D.C.
PUB DATE	22 Dec 87
NOTE	15p.; This report is one of a group gathered by the AASCU/ERIC Model Programs Inventory Project, funded by the Fund for the Improvement of Postsecondary Education to the American Association of State Colleges and Universities, in collaboration with the ERIC Clearinghouse on Higher Education. For related documents, see HE 022 565-617, HE 022 619-643 and HE 022 645-659.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Computer Science; Deafness; Elementary Secondary Education; *Faculty Development; *Hearing Impairments; Higher Education; High Schools; *Mathematics; Models; Professional Training; Program Descriptions; Special Education; State Colleges; *Summer Programs
IDENTIFIERS	*AASCU ERIC Model Programs Inventory Project; *Gallaudet University DC; National Science Foundation

ABSTRACT

The National Science Foundation Summer Institute in Mathematics and Computer Science for Pre-College Teachers of Hearing Impaired Students at Gallaudet College is described in this report. The institute was designed to provide math and computer literacy instruction to such teachers in a 6-week summer program recruiting participants from around the United States. A key component to the institute is the follow-up visit which involves Institute faculty making site visits to participants during the school year to provide support and foster ongoing communication between the school and programs and Gallaudet College. The program was planned on the assumption that although teachers of hearing impaired students have adequate training in deaf education, they have insufficient background in mathematics, have not kept up with the latest developments in mathematics education, and are not sufficiently computer literate. Participants had to take courses in math and computer literacy as well as a course in cognition and problem solving. Various guest presentations and seminars were also required. Evaluation forms filled out by the participants at the end of the summer rated the program very highly overall. Followup visits proved to be an integral and fruitful part of the program. (SM)

ED306847

GALLAUDET SUMMER INSTITUTE
In Mathematics and Computer Science
for Pre-College Teachers of Hearing Imparied Students

Progress Report

April 1, 1986 to November 30, 1987

HE 022 571

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☑ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Harvey Goodstein

Gallaudet Univ

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

AASCU/ERIC Model Programs Inventory Project

The AASCU/ERIC Model Programs Inventory is a two-year project seeking to establish and test a model system for collecting and disseminating information on model programs at AASCU-member institutions--375 of the public four-year colleges and universities in the United States.

The four objectives of the project are:

- To increase the information on model programs available to all institutions through the ERIC system
- To encourage the use of the ERIC system by AASCU institutions
- To improve AASCU's ability to know about, and share information on, activities at member institutions, and
- To test a model for collaboration with ERIC that other national organizations might adopt.

The AASCU/ERIC Model Programs Inventory Project is funded with a grant from the Fund for the Improvement of Postsecondary Education to the American Association of State Colleges and Universities, in collaboration with the ERIC Clearinghouse on Higher Education at The George Washington University.

GALLAUDET

DEPARTMENT OF MATHEMATICS
AND COMPUTER SCIENCE
NSF SUMMER INSTITUTE

KENDALL GREEN
800 FLORIDA AVENUE NE
WASHINGTON, DC 20002

NSF Proposal TEI-8554408
Dr. Harvey Goodstein
December 22, 1987

GALLAUDET SUMMER INSTITUTE
in Mathematics and Computer Science
for Pre-College Teachers of Hearing Impaired Students

Progress Report
April 1, 1986 to November 30, 1987

INTRODUCTION

The Institute is designed to provide math and computer literacy instruction to teachers of hearing impaired students at the pre-college level. The Institute is a six-week summer program that recruits participants from around the United States who are currently teaching at residential schools for the deaf or in public school programs with self contained classrooms for hearing impaired students. A key component to the institute is the follow-up visit which involves Institute faculty making site visits to participants during the school year to provide support and foster ongoing communication between the schools and programs and Gallaudet University.

The project is entering the 21st month of the 39 month grant which concludes on June 30, 1989 (technically 24 months ending March 31, 1988, plus 15 months). The summer institutes of 1986 and 1987 were resounding successes, and the corresponding follow-up visits across the country to schools for the deaf and public school systems with programs serving hearing impaired students have been well received. At this point we are asking for a continuation of the grant and we are anxiously looking forward to conducting the third and "final" six-week summer institute which will be in session from June 27 to August 5, 1988.

The report begins with descriptions of various facets of the project, including recruitment of participants, planning and operation of the summer programs, evaluations, follow-up visits to schools/programs, budgeting, and other areas of relevance. The report concludes with some comments on future outcome and activities which are likely to occur in subsequent years after the expiration of the grant period.

PLANNING

It did not take long for me to realize that much more details and logistics need to be worked out in advance than I had at first anticipated, even for a deceivingly simple 6-week summer program. Also it has been critical to keep lines of communication open with many on-campus and off-campus units, organizations, agencies, schools/programs, and individuals on a regular basis in order to have things put in order and running the way we want them to.

Planning for follow-up visits to schools or programs, for example, was surprisingly time-consuming. To save money and time, arrangements were made so that two or three programs (within 2 or 3 flying hours of each other) would be visited during one round trip, where possible. After making initial calls to a few school administrators, it was then decided to write a letter to all school administrators about the forthcoming follow-up visit and its purposes, to get them ready for our calls. Even then, most often it would not be possible to firm anything up on the first call; either the dates would be bad, or the administrators would be unavailable or out of the office at the time of call. In cases where it was necessary to change dates, calls then had to be made to other programs about possible rescheduling of visits. Finally, travel itineraries had to be worked out with the travel agents, which were not that simple, either.

A perfectionist by nature, but a much wiser man now than before (which I believe I am), I have learned to smile at occasional glitches, and respect Murphy's Law with admiration, namely: "If anything can go wrong, it will."

PARTICIPANTS

Population

The summer institute was designed specifically for the training of teachers of mathematics employed at schools for the deaf, and at programs (mostly within public schools, teaching self-contained classes) serving hearing impaired students in different parts of the country. During the years since the implementation of PL 94-142 about ten years ago, increasingly large numbers of hearing impaired students are "mainstreamed" in public school programs; thus a very large majority of well over 10,000 teachers of hearing impaired students are currently employed at such programs.

Recruitment

Although there has been a great need for the institute, it was quite a challenge to effectively market the institute to pre-college mathematics teachers of hearing impaired students.

It has been difficult to accurately define the actual population of teachers in question, as there certainly would be some (small or new) programs that were not listed in the data base within the Center for Assessment and Demographic Studies (CADS), situated at Gallaudet University. Nevertheless, for the purposes of the institute, we have been comfortable in using the list of about 1300 schools and programs serving hearing impaired students as our primary source of schools/programs from which the teacher applicants were pooled. It should be noted that out of the 1300 schools/programs listed, about 75 of them are of significant size--i.e., programs that serve at least 100 hearing impaired students. At most programs there are fewer than 10 students.

Program announcements were made via brochures (see attached 1986 and 1987 brochures) sent to administrators at 1300 schools/programs serving hearing impaired persons for distribution to teachers. Also, program announcements were made in Gallaudet's summer program catalogs which were sent to a diverse population of professionals in the field of deafness who are on its mailing list.

Selection

In spite of a late start in 1986, and a post office snafu in 1987, there were approximately 70 applications each of these two years for slots of 30 and 40, respectively. The screening and selection of participants proved to be a more difficult process than at first thought. The participants were similar along some parameters yet they were so dissimilar along other parameters. Nevertheless, in order to foster follow-up support, extra effort was made to end up with as many pairs of participants from the same school districts. On the other hand, in order to give different schools the opportunity to send their representative teachers, certain limits had to be placed on the number of participants from each school or program (even though some schools indicated their willingness to provide partial support to enroll additional participants). The questionnaire which the participants filled out and sent to us along with application was helpful. Briefly, the screening committee, consisting of the Summer Institute staff, selected the participants primarily on the basis of 1) their need, 2) the number of hearing impaired students they work with, 3) their stated reasons for coming, and 4) letters of recommendations from their supervisors.

Distribution

Information about the distribution of participants in 1986 and 1987 are provided in the attached tables.

STAFF

Faculty

We have been fortunate to have had a good mixture of faculty during the past two summers, who incidentally are highly regarded as teacher educators and mathematics teachers of deaf students: Dr. Chuck Dietz and Mr. Jay Innes, both from the Math Dept at the Model Secondary School for the Deaf (MSSD); Mr. Clarence Inniss, Math Dept, School of Preparatory Studies; Mr. Ray Kolander and Mr. John Kubis, Math Dept, Gallaudet; and Dr. Vince Daniele, Math Dept, National Technical Institute for the Deaf (NTID) at RIT. See attached brochures for courses taught by them.

It should also be noted that Mr. John Kubis was Gallaudet's contribution for the past two institutes, thus making it possible to use one more teacher than allowed in the project budget.

Secretary and Assistant

I had naively assumed that a secretary would be most needed during the four months preceding, during, and after the summer programs, and budgeted accordingly. Needless to say, I learned it is necessary to use an effective secretary all year around. I was unfortunate that during the first year the departmental secretarial situation was unstable with a number of turnovers. However, Dr. I. King Jordan, Dean of the College of Arts and Sciences, came to my rescue, by allowing me to use Ms. Marianne Doremus, an effective secretary from his office. Moreover, a few months later, after recognizing that I needed more than just secretarial help, Dr. Jordan then assigned Ms. Taya Levine to work with me as a trusty assistant. Her capabilities and effectiveness are what enabled me to get my sleep back. Certainly, I am indebted to Dr. Jordan's strong interest in and support for the project.

SUMMER PROGRAM

Courses

The program was planned on the assumption that although teachers of hearing impaired students have adequate training in deaf education, they have insufficient background in mathematics. Further, it was assumed that teachers of the hearing impaired have not kept up with latest developments in mathematics education as they for the most part are not members of any organization of mathematicians or mathematics educators. Thus, while the courses offered in the area of mathematics are primarily content based to enhance their mathematics background, pedagogical problems and activities are also covered so that they would be able to bring something practical and of direct classroom use back with them to their schools and programs.

Moreover, in recent years with increasing availability of microcomputers at schools, coupled with a large market of educational software on problem solving and mathematics (in drill or instructional format), it is imperative that teachers become computer literate in order to take advantage of computer technology especially as it relates to mathematics instruction. The computer literacy course offered here attempted to do just that.

For the first institute in the summer of 1986, the participants had to take two courses--one in math (primary course) and the other in computer literacy or geometry (secondary course)--for a total of nine (9) credit hours. See the attached 1986 brochure for descriptions of the program and courses. After a couple of weeks, our fear that the workload might be too much for the participants was confirmed. Based on observations made by the staff, and informal conversations we had with a couple of participants, the schedule was changed during the fifth week so that all classes essentially would meet in the morning leaving afternoons free for laboratory work and additional assistance from the faculty.

As for the second summer institute in 1987, the program was modified in response to helpful program and course evaluations provided by the participants and observations shared by the staff. Here, the participants had to take one mathematics or computer literacy course plus a course in cognition and problem solving for a total of seven (7) credit hours. Lest the participants would be deprived of the opportunity to try some software in math and problem solving, the math courses offered were slightly modified to include some time for software experimentation and review. See the attached 1987 brochure for additional information.

Based on evaluations done for summer 1987 program, the following is a preview of the forthcoming summer 1988 program. Although the structure and workload will be similar, there will be some changes in course offerings. The geometry and secondary math (level 2) courses are being replaced with the history of math course; the two new courses to be added are independent study in computer programming, and cognition and problem solving relative to the mathematics curriculum.

Guest Presentations/Seminars

As part of the required summer institute activities, the participants had to attend the seminar type sessions in the afternoons occurring at least once each week, covering various topics in mathematics, computer, and deaf education. One type of seminar involved guest presentations. After the visiting lecturers made their presentations, the participants then took part in discussion and some hands-on activities. In 1986 the guest lecturers and their topics were:

1. Dr. Judy Ackerman, Assoc Prof of Math, Montgomery College, MD: "Math Anxiety, Who Has It?"

2. Dr. Vince Daniele, Assoc Prof of Math, National Technical Institute for the Deaf at RIT, NY: "The Importance of Time in Learning Mathematics" and "Special Needs of Mainstreamed Students."

3. Dr. James (Doc) Williams, Principal, Cardozo High School, Wash, DC: "Cardozo's Mathematics Program--Key Ingredients to its Success."

4. Dr. John Dossey, Prof of Math, Illinois State University, IL (who also is current NCTM President): "Recent Research Findings and Current Issues in Mathematics Education."

5. Mr. Ken Glickman, Senior Programmer/Analyst, IBM Corp, Bethesda, MD: "IBM PC Graphics and Animation Using BASIC."

In summer 1987, the guest presentors were:

1. Dr. Harvey Goodstein, Professor of Mathematics and Program Director, Gallaudet University, "Teaching Mathematics and Problem Solving to Hearing Impaired Students."

2. Dr. David Martin, Dean, School of Education and Human Services, Gallaudet University, "Incorporating Thinking Skills in the Teaching of Mathematics."

3. Mr. Ken Glickman (back by popular demand), "Computer Graphics and Animation."

4. Ms. Jo Israelson, Outreach Program, Kendall Demonstration Elementary School for the Deaf, DC, "How to Share What You Have Learned with Your Colleagues Back Home."

5. Dr. Kathy Heid, Professor of Mathematics, Penn State University, PA, "Mathematics Teaching and Computer Based Algebra Course."

6. Dr. Patricia Davidson, Professor of Mathematics, University of Massachusetts, "Teaching of Mathematics to Learning Disabled Children."

During the past two summers there also were other seminars conducted by the institute staff and participants. Among the topics covered were: 1) "How to Solve Word Problems," 2) NCTM's "An Agenda for Action: Recommendations for School Mathematics of the 1980s," 3) "Introduction to Computer Networks--BITNET and KendallNet," and 4) "Selecting Textbooks and Materials."

Computers

The participants gained experience working with both personal and mainframe computers. Although the personal computers were used by the participants primarily for their computer literacy course, a good number of them also used personal computers for word processing. The computer literacy course was offered in the computer laboratory, which has at least 10 Apple IIes and a couple of IBM PCs, at the MSSD which is situated at the northern end of the Gallaudet campus. Further, well over 30 IBM PCs were available in various labs and user rooms on different parts of the campus; it was at times more convenient to assign computer-related activities for use with the IBM PCs rather than Apple IIes.

The mainframe computer was also used by the participants, primarily for the DEC's VAX mail utility. Indeed, program announcements, activities, and other messages in most cases were given to the participants electronically; the participants quickly developed the habit of checking their electronic mail on a daily basis. The participants also had lots of fun sending all kinds of electronic messages to each other. A few of them even had the motivation to go beyond the VAX mail utility and learned to work with other VAX/VMS utilities and commands.

EVALUATIONS

Program and Course Evaluations

A couple of evaluation forms were filled out by the participants at the end of each summer. Although it was good to know that the participants gave high ratings to the program overall, their extensive comments and suggestions for improvement, especially after the first summer, were most helpful. Briefly, 1) a workload of 9 credit hours was too much; 2) the pace should be slowed down somewhat so that important topics could be covered in greater detail; 3) additional time should be given to methodology and appropriate uses of computers and software in classroom; and 4) there should be two sections each of elementary and secondary mathematics courses to achieve more homogeneous groupings of participants. Some of them commented that six weeks was too long, but then they did not think they could commit themselves to four week programs in two consecutive summers. The participants also commented that they could not believe how much they had learned in six weeks, and how much they had benefitted by interacting with each other and sharing common concerns regarding teaching mathematics to hearing impaired students. One secondary teacher commented: "...[secondary math course] far exceeded what I expected to get out of this class. Not only did I feel I've learned new math concepts but I am inclined to pursue my studies in math..."

As mentioned briefly earlier, several changes were incorporated into the second summer program. The 1987 evaluations done by the participants were very favorable, assuring us that the expectations of the institute were realistic and attainable. Nevertheless, there were useful suggestions and comments about courses, including ideas for new and replacement courses which will be offered in the next summer's program mentioned above.

Pre- and Post-Tests

One of the primary goals of the institute is to enhance the mathematics background of teachers. To determine whether the summer programs were effective in this respect, pre- and post-tests were given.

In 1986 the tests were taken by the participants in the two primary courses only--Mathematics for Elementary Teachers, and Mathematics for Secondary Teachers. For the elementary math course, the mean scores jumped nearly three-fold from 9.8 (out of 43) on pre-test to 40.8 (out of 50) on post-test. These tests for elementary teachers were developed by the instructor of the course. As for the secondary math course, the MAA's Calculus Readiness Test was used for pre-and post-tests. Here, the mean scores increased from 9.4 to 17 (out

of 25), for about an 80% gain. Undoubtedly, the elementary and secondary teacher participants had made significant growth mathematically at the conclusion of the institute, not to mention additional professional growth in other areas as well. Moreover, the improvements made in math backgrounds were remarkable, since the courses did not complete all the objectives, due to insufficient time and unrealistic expectations.

In 1987, the pre- and post-test results (mean percentages, out of 100%), respectively, in the following courses were: 32% and 85% in elementary math level 1; 35% and 69% in elementary math level 2; 30% and 59% in secondary math level 1; 34% and 75% in secondary math level 2; and 42% and 90% in computer literacy. Thus, the percentages nearly doubled in every case.

FOLLOW-UP

As part of the program, follow-up visits were made by the project director and staff members to the participating schools/programs, i.e. schools/programs from where the participants came. The purposes of the visits were to: 1) talk with the participants and their colleagues and administrators to get additional feedback about the institute and how it applied to their teaching in classrooms; 2) observe classes taught by the participants themselves and other teachers to better understand the realities of types and levels of students the teachers work with, learning and teaching processes involved, and classroom interactions and dynamics; and 3) conduct presentations and workshops on mathematics teaching, computer education, and problem solving for elementary and secondary teachers of mathematics.

As it turned out, the follow-up visits proved to be an integral and fruitful part of the program. First, it enabled us to get out of the "ivory tower" (or "God's Land" as one called our campus) and see the real world; we have learned a lot of things about schools and programs that we could not possibly get from books. Second, the students, teachers, administrators, professionals, and parents were very appreciative of our visits and our "reaching out to them"; lots of questions thrown at us were answered about mathematics education, deaf education, and higher education including Gallaudet University. Third, the presentations and workshops given by the institute faculty (with the aid of interpreters for some of us), with about 10 to 60 attendees each, were highly regarded and lauded; as a matter of fact we often were asked to go back and conduct additional workshops which we unfortunately were not able to do so. Fourth, communication has been opened up between post-secondary and pre-college teachers and programs, and thus encouraged working relationship between us as it should be. That is,

there was a ripple effect at its best, and the money (although somewhat insufficient) allotted for such visits was well spent.

IBM GRANT

We are fortunate to be awarded an IBM grant of approximately $20,000 for five (5) IBM PC/XT computers and color monitors for use with the institute. Three of these are placed in the computer lab here (HMB 275) and the other two in the computer lab at MSSD.

COST SHARING

Gallaudet has contributed significantly toward the project. Items like office equipment, personal computer peripherals, meals for visiting lecturers, welcome dinner, gifts and prizes for the participant, photography, and printing were supported by Gallaudet for a total sum of approximately $7,500 to date. In addition, Gallaudet has assumed additional expenses of approximately $80,000 for additional faculty, secretarial support, assistant to the director, increases in salaries, and other direct costs. Thus, it can be safely said that to date Gallaudet has given support for at least 20% of the total cost of the project.

BUDGET

Simply stated, it is anticipated that all of the budgeted money, for two years ending March 31, 1987, will be spent, with the exception of room, board, and travel monies for the participants. This is because there were some participants from the Washington metro area who chose to commute to classes and therefore did not require travel or board money.

Not all budget items of the project budget were spent as specified, however. Some of the budgetary items were adjusted using OPAS. Briefly, significant changes were made with interpreter services (decreased, fortunately!), secretarial (increased), and staff travel (increased). The participants indicated no need for interpreters in classes; thus most of the money earmarked for interpreting services were (via OPAS) used for unanticipated high costs for staff travel and additional secretarial help.

The status of the project budget, as of December 22, 1987, is given in the attached. At first glance, based on the projected available funds for Year III+ (which includes months 25 through 39 starting April 1, 1988), there should be $227 left over at the completion of the project. However, upon close examination, it is evident that the projected surplus monies (total $11,244) for participants more than

offset the projected deficits in the areas of salaries, staff travel, fringe benefits and other direct and indirect costs. Accordingly, at this point we would like to ask whether arrangements could be made for us to transfer about $11,000 of participants' surplus money to other areas of the budget to cover the deficits.

FUTURE PLANS

Between now and the end of the grant period on June 30, 1989, we will do everything we can to ensure that the 1988 summer program will be the best ever, and to assure that we can visit all the schools and programs across the country where the participants come from.

As for the years following the grant period, there are several possibilities, some of which could conceivably occur simultaneously. First, depending on the needs and demands of the pre-college teachers, some (or all) of the institute courses could continue to be offered here. Second, workshops or mini-courses lasting for up to a week or two could be offered here or at any of the six Gallaudet's regional centers, covering some of the topics presented in the institute courses. As a matter of fact, we have been approached about this possibility for next summer! Third, we might start working on a proposal for a new program such as a math clinic in which the teachers could work on developmental math with deaf students; or on a proposal for establishing networking system among teachers who are more or less isolated in different school districts. The next few years should prove interesting and challenging.

PARTICIPANT DEMOGRAPHICS

	1986	1987
Enrollment		
Anticipated	30	40
Applicants	73	69
Admissions	30	41
Level of Training/Teaching*		
Elementary	20	19
Secondary	10	18
Special Populations		
Ethnic Minorities	5	5
Women	24	29
Deaf/Hearing Impaired	9	11

1986 Course Registration		1987 Course Registration	
Elem. Math/Comp. Lit	20	Elem. Math Level I	10
Sec. Math/Comp. Lit	4	Elem. Math Level II	8
Sec. Math/Geometry	6	Sec. Math Level I	8
		Sec. Math Level II	5
		Computer Literacy	10

* In the field of education of the deaf, some teachers often find themselves teaching students at a variety of levels in one classroom or at different levels from year to year. It is difficult, if not impossible, therefore, to give a more detailed breakdown of teaching levels.